are occupied with the anatomy and physiology of the semicircular canals—those amazing, delicate, extended tubules of the internal ear, which, being themselves in different planes, somehow ensure our adjustment to the different planes of our surroundings. The third part of the book, pages 339 to 525, is concerned with sea-sickness, which Dr. Byrne has studied for many years, with consummate patience, in himself. He rightly points out that the final arbiter, in sea-sickness, is neither stomach, nor semicircular canals nor other outlying kingdoms of the body, but the brain itself, the Capitol of life. Every page of his book is full of learning, and crowded with condensed facts: it is a splendid example of laborious thoroughness. Such work seems to leave not a word more to be said on the subject.

(4) It is a strange contrast between Dr. Byrne's close-packed, exhaustive monograph and Mr. Crispin's short manual. Mr. Crispin writes for "those who are stationed or travelling in out-of-the-way parts of the world, away from medical advice." His book is very short, very laconic; the rules which he gives are shrewd, practical, and accurate, so far as they go, but the book is too short. Still, it is a good little book, and he writes of what he knows through and through; for he is Assistant-Director of the Sudan Medical Department. The book gives many useful hints for the safe-guarding of a man's health when he is hopelessly out of reach of medical or surgical help.

(5) Dr. Woodcock's book offers another contrast. It is a series of essays on the doctor's life and work, his duty to his patients, his duty to the public, his duty to his own profession. It is written very pleasantly, with innumerable good instances, vivid experiences, and kindly words of praise for the famous doctors and surgeons of to-day. Perhaps the best chapters are those on contract practice, Poor Law experiences, and public health. Dr. Woodcock has seen dreadful things in the slums, and has fought them. In other happier chapters, he praises Edinburgh, his University, and Leeds, that nursing-mother of many great physicians and surgeons. It has been said that "doctors, when they write well, write very well indeed," and Dr. Woodcock can write very well indeed. He is at his best when he tells of what he has seen with his own eyes and done with his own hands.

(6) Dr. Lickley's manual on the nervous system is very clearly written and well illustrated. He is a demonstrator of anatomy at Newcastle (University of Durham), and writes for students medical and non-medical. The chapters on the minute anatomy of the brain and spinal cord must be read alongside of dissections; but there are many passages in the book which are of great interest to the general reader, and are made easily intelligible by diagrams and pictures. There is room, in the next edition, for a diagram of the motor areas of the brain, marked in their proper places on its surface. We commend this book to all who wish to get a plain understanding of the chief facts concerning the central nervous system.

BIOLOGICAL PROBLEMS.

(1) *Upon the Inheritance of Acquired Characters.* A Hypothesis of Heredity, Development, and Assimilation. By Eugenio Rignano. Authorised English translation by Prof. Basil C. H. Harvey. With an Appendix upon the Mnemonic Origin and Nature of the Affective or Natural Tendencies. Pp. v+413. (Chicago: Open Court Publishing Co., 1911.) Price 12*s.* 6*d.* net.

(2) *Biological Aspects of Human Problems.* By Christian A. Herter. Pp. xvii+344. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1911.) Price 6*s.* 6*d.* net.

(1) THIS book, by the talented editor of *Scientia,* appeared in French in 1906, and later in German and Italian. We welcome it in its excellent English translation by Dr. Basil Harvey. Approaching the problem of inheritance from the side of physics and engineering, Rignano confesses that he was at first attracted to Weismann's position that there is no evidence of the transmission of somatic modifications. He felt, however, that the fundamental biogenetic law of ontogeny recapitulating phylogeny was difficult to reconcile with non-transmission. Reflecting on this difficulty, he was led to a new biogenetic hypothesis, which suggests a mechanism whereby the inheritance of acquired characters may be effected. Whatever one may think of the special hypothesis which the book expounds, there can be no two opinions as to the author's fair-mindedness, scholarship, and ingenuity.

According to Weismann's view, a reproductive portion of the germ-plasm is segregated in early development from the portion that forms the soma, and remains apart without sharing in body-making. According to Rignano's "centroepigenetic hypothesis," "the germinal substance, although limited to a single zone, and separated and differentiated from the rest of the soma, nevertheless exercises its epigenetic, formative action upon all the rest of the organism and during the whole of development, without undergoing any alteration whatever through this participation in development." We do not understand why the somatogenic part of the germ-plasm, which has the developing of the body as its business, should require any assistance from the primordium of the future gonads. For this is what it seems to us to come to. Early in the book, Rignano speaks of the germinal substance exerting a formative influence on the developing soma, but he draws a curious distinction between the *effective* germinal zone (or "true place of origin of the germinal substance") and the *apparent* germinal zone (or the place where the sexual cells are built up out of material separated out or secreted by the effective germinal zone); and gradually it turns out that in higher animals the activating central zone is constituted by the least differentiated part of the nervous system. So the hypothesis has nothing to do with pervasive gonadial hormones. In any case, Rignano's view is that the central zone activates the developing organism, provoking a passage from one ontogenetic stage to another, until the equilibrium of the adult stage is reached. Then, however, a new perturbing influence comes into play: the body exhibits functional modifications. This implies the deposition of specific elements in the somatic nuclei, and some of these are deposited likewise in the germinal substance of the central zone. It is thus that the transmission of acquired modifications becomes possible. A specific potential element deposited in the nucleus by a specific nervous current flowing through it may also be called an elementary nervous accumulator. It adds itself to others already present without changing them, and it is able, as soon as it finds itself again in conditions of environment like those present at the moment when it was deposited, to restore the same specific current by which it was deposited. We rub our eyes and wonder if we are reading biology at all.

It is impossible in a few lines to do justice to an elaborate attempt to establish a new biogenetic theory, but we would submit the following remarks:—(*a*) Many who are disinclined to dogmatism on the subject of the non-transmission of somatic modifications, who feel that "there must be something in Lamarckism after all," will be in sympathy with Rignano's enterprise. (*b*) If the variations that count are germinal, and if the continuity of the germ-plasm expresses a fact, there is no difficulty in reconciling a reasonable statement of the recapitulation doctrine with Weismann's position. (*c*) It seems to us that Rignano has not taken sufficient account of the modifications that the recapitulation doctrine has been coerced to accept at the hands of expert embryologists. (*d*) It appears to us that Rignano has misunderstood Weismann's, or, indeed, the modern conception of development. (*e*) We think that the author, who has all our admiration, has been in his theory of "centroepigenesis" entirely misled by irrelevant physical analogies.

(2) The late Dr. Herter was led to write this book by the conviction that the conclusions of biology ought to furnish some trustworthy guidance in the art of life. The first chapter seeks to show that the animal body is a mechanism, and that the mechanistic theory is the one which now best serves the interests of humanity. But the difficulties of the mechanistic conception are inadequately stated, and the modern statement of the vitalistic position is not dealt with. In the second chapter, which deals with growth and reproduction, Mendelism is regarded as a discovery gained through the mechanistic hypothesis, and the theory of sex chromosomes as a corroboration. This will be apt to suggest to the unwary reader that the alternative to the mechanistic view is something mystical or magical. The third chapter is a frank advocacy of the view that the physical processes in the brain precede and cause the various phases of psychical life; the human animal is a conscious automaton; the mind is a function of the brain. The difficulties of this materialistic position are not appreciated.

The second part of the book deals with the self-preservative instinct in its varied expression and with the difficult problem of controlling it in the interests of the race as a whole. Its chapters are full of good counsel based on the author's wide experience and long reflection.

The third part of the book is devoted to the so-called sex instinct, and its pervasive influence for good and ill. We can only refer to a few points. The instinct has to be imperious, and is therefore a source of danger. As Emerson said, "the preservation of the species was a point of such necessity that Nature has secured it at all hazards by immensely overloading the passions, at the risk of perpetual crime and disorder." According to Dr. Herter, one of the most important evolutionary changes in progress is "a betterment in the attitude of women toward the ideals—or lack of ideals—harboured by men." In reference to the problems of marriage, it is rightly insisted that one criterion at least may be relied on, namely, the welfare of the family.

We have then a thoughtful endeavour to use biological results in the guidance of life. The author was a medical professor in Columbia University, and a scholarly biologist. His book is leagues away from anything amateurish or faddist; it is full of wise teaching. And yet we must confess that it is to us amazingly disappointing, being shackled with materialistic and naturalistic limitations. We must, indeed, always pay respect to the courage of naturalism—what Huxley called "the resolute facing of the world as it is." We doubt, however, whether the form it takes in this book is necessary or warrantable. "It assumes that the human organism, like all others living on the surface of the earth planet, is a machine; and it assumes that there is no evidence that this machine is not a machine in all respects, like any engine which is the creation of man." But this is an assumption that we dare not scientifically make: it gives a false simplicity to the facts, and it does not work out.

RECENT BOOKS ON CHEMISTRY.

(1) *Organic Chemistry.* By Prof. W. H. Perkin, F.R.S., and Prof. F. Stanley Kipping, F.R.S. Pp. xi+664+xx. Entirely new edition. (London and Edinburgh: W. and R. Chambers, Ltd., 1911.) Price 7*s.* 6*d.*

(2) *An Experimental Course of Physical Chemistry.* Part ii.—"Dynamical Experiments." By Dr. James F. Spencer. Pp. xvi+256. (London: G. Bell and Sons, Ltd., 1911.) Price 3*s.* 6*d.*

(3) *A First Year Physical Chemistry.* By Dr. T. P. Hilditch. Pp. xx+176. (London: Methuen and Co., Ltd., 1912.) Price 2*s.* (Text-books of Science.)

(4) *Physico-Chemical Calculations.* By Dr. Joseph Knox. Pp. viii+188. (London: Methuen and Co., Ltd., 1912.) Price 2*s.* 6*d.* (Text-books of Science.)

(5) *Practical Chemistry for Engineering Students.* By Arthur J. Hale. With an introductory note by Prof. R. Meldola, F.R.S. Pp. xx+192. (London: Longmans, Green and Co., 1912.) Price 3*s.* net.

(6) *A School Chemistry.* By F. R. L. Wilson and G. W. Hedley. Pp. xxii+572. (Oxford: the Clarendon Press; London, Edinburgh, New York, Toronto, and Melbourne: Henry Frowde, 1912.) Price 4*s.* 6*d.*

(7) *Notions Fondamentales d'Analyse Qualitative.* By Prof. V. Thomas and D. Gauthier. Pp. viii+331. (Paris: Gauthier-Villars, 1912.) Price 10 francs.

(1) THE new edition of Perkin and Kipping's "Organic Chemistry" embodies all the familiar features of the earlier editions. But the material of the Appendix has now been incorporated in Parts i. and ii., and new chapters or sections have been added, dealing with subjects such as the Grignard reagents, the configuration of the carbohydrates, and the cyclo-paraffins. In its revised form the book will carry on effectively the useful work of the former editions as a standard text-book of organic chemistry.

(2) The second part of Dr. Spencer's "Experimental Course of Physical Chemistry" describes the methods to be used in carrying out a number of "dynamical experiments" on mass-action, electrolysis, thermo-chemistry, and radio-activity. To those who are already familiar with the first part of the work no further commendation of the volume now issued will be needed.

(3) The production of a "First Year Physical Chemistry" is an interesting sign of the importance that is now attached to a subject that has attracted to itself so large a proportion of workers in both branches (organic and inorganic) of pure chemistry. But Dr. Hilditch's book is of greater importance than its unassuming title would suggest. Whereas so many text-books of physical chemistry bear upon almost every line of their text the imprint "made in Germany," Dr. Hilditch has written a book that is refreshingly new in its point of view, and one which would make an excellent basis for a larger volume on the subject. It is remarkable to how large an extent English writers who have come under the influence of the German school of physical chemistry have based their exposition upon Continental lecture courses, attaching excessive importance to those topics which have been included in the syllabus of the Continental schools, and ignoring or neglecting work of fundamental importance which has been done in their own country. Dr. Hilditch has written a well-balanced book, in which ions are regarded as of less importance than atoms, and dilute solutions are not allowed to monopolise an undue proportion of the space available. He has thus found room to describe Sir William Perkin's work on magnetic rotatory power, and has devoted an exceptional amount of attention to the physical chemistry (including the optical rotation) of organic compounds. The chapter on "Crystalline Structure" covers less than six pages, but is an admirable summary of the salient points.

(4) Dr. Knox has put together a series of 365 problems, to many of which full solutions are given in the text. The book will be very useful to those whose fortune it is to be tested by examiners who believe in numerical exercises as a test of exact knowledge in physical chemistry.

(5) Mr. Hale is one of those who are engaged in teaching chemistry to students who, "preparing for some particular profession or industry," fail (as Prof. Meldola points out in an introductory note) "to realise the importance of subjects which they regard as being outside their own province." Mr. Hale's solution of the problem of securing efficient instruction for such students depends on using those facts with which they are most familiar and to which they attach most importance, in order to prove and illustrate the fundamental laws and principles of chemistry. In the book under review the engineer's point of view has been specially studied, and a course of preparations, qualitative and quantitative analysis, is described